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(21) International Application Number: PCT/KR99/00089 (22) International Filing Date: 26 February 1999 (26.02.99) (30) Priority Data: 1998/6706 2 March 1998 (02.03.98) KR (71) Applicant (for all designated States except US): KOREA SECURITY PRINTING AND MINTING CORPORATION [KR/KR]; 35, Kajong-dong, Yusong-gu, Taejon 305-350 (KR). (72) Inventors; and (75) Inventors/Applicants (for US only): KIM, Jong, Kyu [KR/KR]; Kangbyun Apt., 109-1702, Mannyun-dong, Seo-gu, Taejon 302-150 (KR). PARK, Yong, Hwan [KR/KR]; Green Town Apt., 106-405, Beob-dong, Taeduk-gu, Taejon 306-060 (KR). (74) Agents: JANG, Seong, Ku et al.; KEC Building, 17th floor, 275-7, Yangjae-dong, Seocho-ku, Seoul 137-130 (KR).		(81) Designated States: CN, RU, US, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report.</i>
(54) Title: IMPROVED PROCESS FOR THE PREPARATION OF SECURITY THREAD		
(57) Abstract A security thread having an enhanced security feature is produced by forming a water-soluble ink layer on a selected portion of the surface of a transparent film; depositing a metal layer on the film surface including the water-soluble ink layer; and washing the metal deposited film with water to remove the portion of the metal layer deposited on the water-soluble ink layer.		

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IMPROVED PROCESS FOR THE PREPARATION OF SECURITY THREAD

Field of the Invention

5 The present invention relates to an improved process for the preparation of security threads suitable for use in security articles.

Background of the Invention

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Security documents such as bank notes, stocks, bonds, checks, warrants and identification cards need to be guarded by antifalsification measures and they are often made from a security paper having a security element in the form of
15 fibers, strips or threads embedded therein.

For example, GB 2,213,098 discloses a partially metallized film strip, used as a security thread, which has metal-free portions in the form of a pattern, design, indicia, etc. to provide a continuous metal path along the
20 length of the strip.

Further, Japanese Laid-open Patent Publication No. 216795/1988 teaches a security strip having a metallized pattern on the surface of a transparent film.

However, prior art method of preparing partially
25 metallized films, useful as security threads, comprise complicated and hazardous etching techniques.

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Summary of the Invention

It is, therefore, an object of the present invention to provide an improved process for preparing a security thread
5 suitable for use in a security paper.

It is another object of the present invention to provide a security thread having enhanced security features.

It is still another object of the present invention to provide a security paper containing the inventive security
10 thread.

In accordance with an aspect of the present invention, there is provided a process for the preparation of a security thread having a partially metallized layer, which comprises: forming a water-soluble ink layer on a selected
15 portion of the surface of a transparent film; depositing a layer of a metal selected from the group consisting of aluminum, tin, silver and an alloy of cobalt and nickel on the entire surface of the transparent film including the water-soluble ink layer; and washing the metal deposited
20 film with water to remove the portion of the metal layer deposited on the water-soluble ink layer.

Brief Description of Drawing

25 The above and other objects and features of the present invention will become apparent from the following description, taken in conjunction with the accompanying drawing, wherein:

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Figs. 1 to 4 show the steps of forming a partially-metallized film having a transparent region in the form of a set of characters and a dyed region in the form of another set of characters in accordance with one embodiment of the present invention; and

Figs. 5 to 8 illustrate other embodiments of security threads prepared in accordance with the inventive process.

Detailed Description of the Invention

10

In practicing the present invention, a water-based ink, which is soluble in water, is printed on a selected portion of the surface of a transparent film substrate, in the form of a character, pattern or figure to form a partial water-soluble ink layer. The substrate may be made from any material known in the art such as a polyester (e.g., polyethylene terephthalate (PET)), polyvinyl chloride, polypropylene and the like. The water-based ink may be any one conventionally used in the art.

20

Subsequently, a layer of a metal is deposited on the entire surface of the film including the printed ink layer. The deposition may be carried out by vacuum deposition methods which are well known by a skilled person in the art. Representative examples of the metal suitable for forming the metal layer are aluminum, tin, a metal alloy (e.g., Co and Ni), silver and the like. The thickness of the metal layer ranges from 1 Å to 2 μm.

25

Thereafter, the metal-deposited film is washed with

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water, preferably with brushing, to remove the portion of the metal layer deposited on the water-soluble ink layer, to obtain a film having a partially metallized layer.

In the present invention, a security thread having a
5 enhanced security feature may be obtained by employing a
fluorescent pigment or dyestuff to provide a partially
metallized film having both a demetallized portion and a
dyed portion. In this case, a partial coating of the
fluorescent pigment or dyestuff is applied to a selected
10 portion of the film surface prior to the step of printing
the water-soluble ink. Alternatively, if desired, the
water-soluble ink layer may be so formed as to mask the dyed
portion. The fluorescent pigment or dyestuff may be any one
conventionally used in the art and the coating thereof may
15 be applied in the form of a character, pattern or figure, or
a combination thereof, preferably by a gravure printing
method.

The security thread of the present invention has a
thickness and width suitable for use in security documents,
20 e.g., a thickness ranging from about 15 to 35 μm and a width
ranging from 0.5 to 5 mm.

The security thread of the present invention may be
preferably embedded between two sheets of paper formed
separately on a paper making machine and subsequently
25 brought together to form a security paper having an embedded
security thread.

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One Embodiment of the Invention

Figs. 1 to 4 show the steps of forming a partially-metallized film having a transparent region in the form of a set of characters and a dyed region in the form of another set of characters in accordance with one embodiment of the present invention.

Referring to Fig. 1, a fluorescent dyestuff or pigment composition such as Lumilux CD 305, CD 316 or Papilion is applied in the form of a set of characters (2) on the surface of a transparent polyester substrate (10) at a regular interval by a gravure printing method.

Subsequently, as shown in Fig. 2, a water-based ink is printed on the film to form a mask (30) of the printed characters portion (2) and, simultaneously, a design (31) in the form of another set of characters.

Aluminum is deposited on the resulting film by a vacuum deposition method to form an aluminum layer (4) at a thickness of 1 Å to 2 μm over the entire surface of the film, as shown in Fig. 3.

Finally, the portions of the aluminum layer deposited on the mask (30) and the design (31) are removed by washing with water, while brushing, to obtain an aluminum-deposited film (1) comprising transparent characters (5) (corresponds to the design (31)) and printed characters (2) positioned in a transparent region (10).

Figs. 5 to 8 illustrate other embodiments of security threads prepared by the inventive process. Specifically,

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Fig. 5 shows a security thread (1) having alternating metal-deposited portion (4) comprising transparent characters (5), and transparent substrate region (10) comprising colored characters (2) at a regular interval.

5 Further, referring to Fig. 6, there is provided a metallized security thread (1) having various patterns of colored regions (2), optionally positioned in transparent regions. Fig. 7 shows a security thread (1) produced by forming metallized bands (4) in a regular pattern on a
10 transparent base film (10), and Fig. 8 shows a security thread (1) obtained by a chain of imprinting alternating colored (2) and metallized links (4) on a base film (10).

While the invention has been described with respect to
15 the specific embodiments, it should be recognized that various modifications and changes may be made by those skilled in the art to the invention which also fall within the scope of the invention as defined by the appended claims.

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Claims:

1. A process for the preparation of a security thread having a partially metallized layer, which comprises:
 - 5 forming a water-soluble ink layer on a selected portion of the surface of a transparent film; depositing a layer of a metal selected from the group consisting of aluminum, tin, silver and an alloy of cobalt and nickel on the entire surface of the transparent film including the water-soluble
10 ink layer; and washing the metal deposited film with water to remove the portion of the metal layer deposited on the water-soluble ink layer.
2. The process of claim 1 further comprising applying a
15 partial coating of a fluorescent pigment or dyestuff on the surface of the film in the form of a figure, character or pattern, prior to the step of forming the water-soluble ink layer.
- 20 3. The process of claim 2 wherein the water-soluble ink layer masks the pigment or dyestuff coating.
4. The process of claim 2 wherein the transparent film is made of a polyester or polyvinyl chloride.
- 25 5. A security thread prepared by the process of any one of claims 2 to 4.

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6. The security thread of claim 5 wherein the security thread has a thickness ranging from 15 to 35 μm and a width ranging from 0.5 to 5 mm.
- 5 7. A security paper comprising the security thread of claim 5 or 6.

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Fig. 1

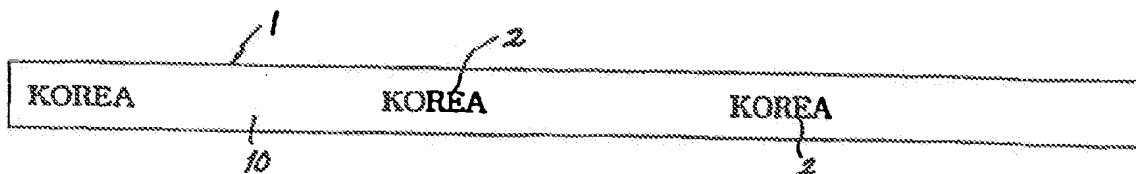


Fig. 2

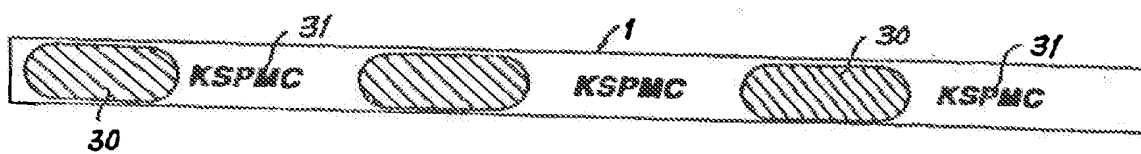


Fig. 3

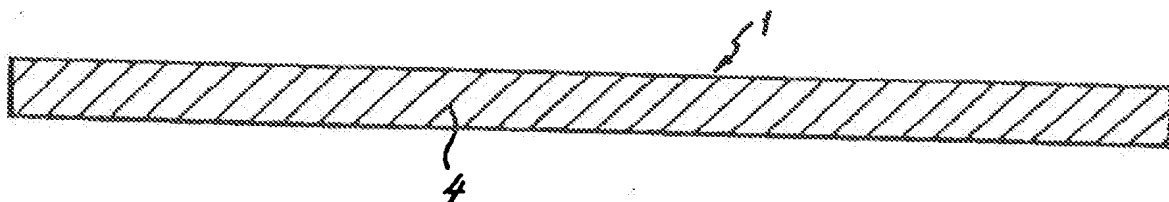
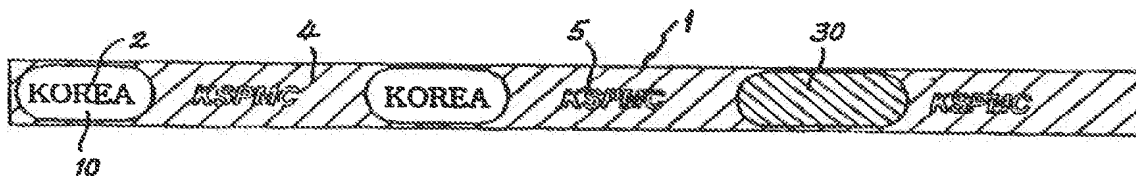


Fig. 4



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Fig. 5

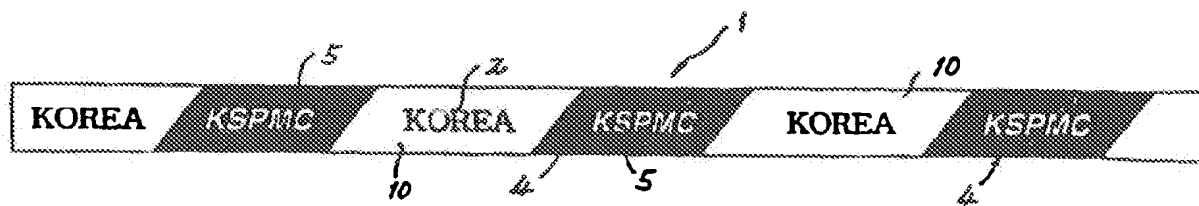


Fig. 6

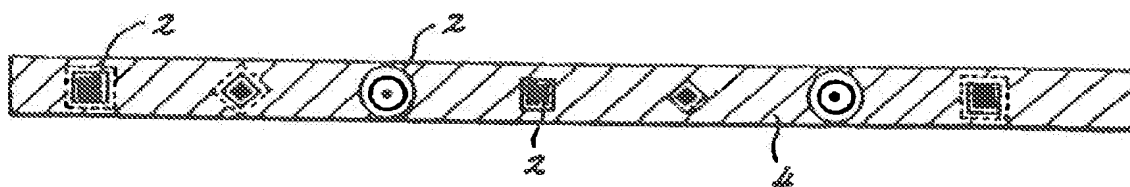


Fig. 7

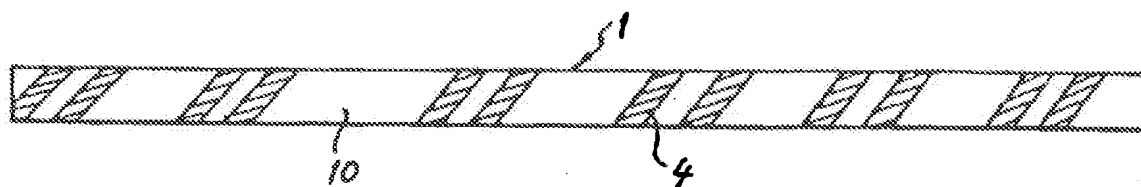
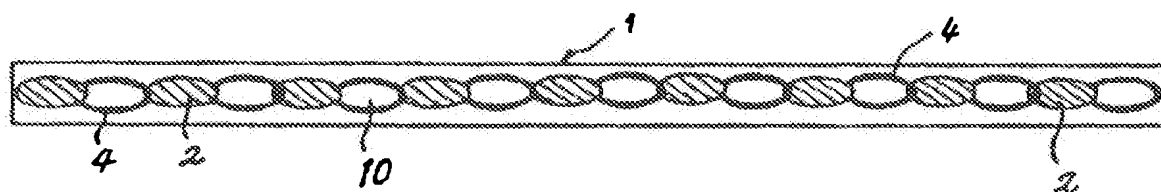


Fig. 8



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR 99/00089

A. CLASSIFICATION OF SUBJECT MATTER

IPC⁶: D 21 H 15/00, 21/54

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC⁶: D 21 H 15/00, 21/54

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 176 403 A1 (SOTIMAG) 02 April 1986 (02.04.86), claims 1-9.	1-7
A	DE 40 00 786 A1 (KISOKASEISANGYOU CO., LTD.) 16 May 1991 (16.05.91), claims 1-3.	1-7

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

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Date of the actual completion of the international search

18 May 1999 (18.05.99)

Date of mailing of the international search report

21 June 1999 (21.06.99)

Name and mailing address of the ISA/AT

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR 99/00089

EP 176403

A security document has a PVC substrate with a location for a signature is protected against fraudulent use by applying to the signature location a layer of ink which contains a pigment and a filler to impart a degree of porosity to it; applying to selected zones of the ink layer a porous transparent varnish which contains a dissolved powder which provides fluorescence of a desired colour when exposed to UV, overprinting the ink and varnish layers with a watermark by screen printing with a pigmented vinylic ink; and appending the signature to the card holder using a felt pen with indelible ink such as that available commercially under the name „Corrector“ (RTM). The card is difficult to forge and the signature cannot be changed without affecting the watermark. The cards are useful as credit cards, travel passes, and so on.

DE 4000786

The structure of security document paper, to prevent reproduction by a photocopier and the like, has a paper substrate with a coloured layer printed on one surface in an orange, brown or red shade to cover the whole surface area. A silver coloured layer is printed on the coloured layer to cover it completely with a bead, grained or stich pattern. A surface cladding is applied to the whole silver coloured layer. In another form, the paper substrate is coated with a silver layer in a bead, grained or stich pattern to cover the whole surface. A further coloured layer is applied over the whole silver layer, using a red, brown or orange transparent coating. The paper gives readable print, but gives a totally black image on reproductions from an electrostatic copier or camera.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR 99/00089

In Recherchenbericht angeführtes Patentdokument Patent document cited in search report Document de brevet cité dans le rapport de recherche	Datum der Veröffentlichung Publication date Date de publication	Mitglied(er) der Patentfamilie Patent family member(s) Membre(s) de la famille de brevets	Datum der Veröffentlichung Publication date Date de publication
EP A1	176403	02-04-1986	FR A1 2570101 14-03-1986 FR B1 2570101 25-09-1987 JP A2 61179798 12-08-1986 US A 4627642 09-12-1986
DE A1	4000786	16-05-1991	DE C2 4000786 18-11-1993 GB A0 9001519 21-03-1990 GB A1 2238755 12-06-1991 GB B2 2238755 28-04-1993 JP A2 3152583 28-06-1991 US A 5114782 19-05-1992